REMARKS

Claims 1-5, 15-19, 22-26, 30, 31 and 33 are pending herein. Claims 6-14, 20, 21, 27-29 and 32 have been cancelled without prejudice or disclaimer. Claims 1, 3 and 5 have been amended to include the subject matter of cancelled claims 8, 10 and 12, respectively. Attached hereto as page 10, pursuant to Rule 1.121(c)(1)(ii), is a marked-up version of the amended claims. New claim 33 is added hereby as supported by Fig. 17 of the present application.

Examiner Forman is thanked for courtesies extended to Applicants' representative during a telephonic interview on July 16, 2002. The substance of that interview has been incorporated into the following remarks.

1. The objection to the specification is noted, but deemed moot in view of the substitute specification paragraph filed herewith.

2. Claims 30-32 were rejected under §112, first paragraph. The cancellation of claim 32 renders this rejection moot with respect to claim 32. With respect to claims 30 and 31, the PTO is alleging that the specification does not contain an enabling description of the "non-permeable base plate" feature recited in claims 30 and 31. With reference to page 1, line 13 of the present application, a microscopic glass slide is given as an example of the material from which the presently claimed base plate can be formed. As such, one skilled in the art would readily understand that glass is non-permeable with respect to the capture solution, as evidenced by the statement appearing in Section 8 of the Office Action (page 9, 4th paragraph). Reconsideration and withdrawal of this rejection are respectfully requested.

3. Claims 1-6, 8-13, 15-20, 22-27 and 29-32 were rejected under §102(e) over Felder et al. The cancellation of claims 6, 8-13, 20, 27 and 32 above renders this rejection moot with respect to those claims. To the extent that this rejection might be applied against the remaining amended claims, it is respectfully traversed.

As explained during the telephonic interview, the cancellation of claim 6 and incorporation of the subject matter of claims 8, 10 and 12 into claims 1, 3 and 5, respectively, renders all of the rejections in the Office Action moot with the exception of the rejection of independent claims 1, 3 and 5 over Felder. In addition, the claims of the present invention are now limited to supplying the capture solutions onto the base plate by means of an ink jet system, which, as discussed below, yields a final product that is structurally distinct from Felder.

Felder does not disclose a plurality of sample spots arranged on a base plate having different spot sizes, as recited in pending claim 1. The PTO is alleging that Felder's disclosure of oligonucleotide anchors attached to beads or particles of different sizes "provides different spot sizes as claimed" (see paragraph 7 of the Office Action). These beads and particles are not, however, spots formed by an ink jet system, as now claimed. Moreover, Felder discloses varying the size of the support surface (e.g., the beads and particles) instead of varying the size of capture solution "spots" arranged on the support surface. Felder clearly distinguishes between a sample "spot" and the support on which the sample spot is positioned (column 30, lines 30-32 of Felder).[1] Therefore, since Felder's expressly distinguishes between beads or particles of different sizes and "spots", the PTO cannot summarily assert that Felder's beads or particles "provide different spot sizes as claimed," as stated in the Office Action. Again, the beads and particles in Felder are not formed by an ink jet system, as now claimed.

During the above-mentioned telephonic interview, the PTO challenged Applicants' representative to explain why Felder's beads or particles could not be interpreted to be spots having different spot sizes. As clearly demonstrated above, Felder itself distinguishes between

[1] Felder discloses that 10 nanoliter droplets of oligonucleotide anchor solution are dispensed from an ink jet printer on a support structure (e.g., in wells on a plate).

spots formed on a support and beads/particles carried by a support. Since the disclosure in Felder directly contradicts the PTO's position (as discussed above, Felder's beads and particles are not "spots" formed by an ink jet system), skilled artisans would not, and could not, understand that Felder's beads and particles are "spots" having different spot sizes. Although Felder does disclose forming spots by ink jet printing (col. 30, Example 1), the spots are all the same size, not different sizes as recited in claim 1. Accordingly, at least claim 1 and all claims dependent therefrom are allowable over Felder.

With respect to claim 3, Felder teaches varying the concentration of a sample solution from sample well to sample well by increasing the number of sample spots (formed by ink jet printing) in each well (as shown in Fig. 12 of Felder). Felder does not disclose, however, varying the concentration of the sample solution *from spot to spot*, as recited in pending claim 3. The PTO is alleging that Felder's sample wells satisfy the sample spots feature of claim 3 (see page 7 of the Office Action). Again, with further reference to column 30, lines 30-32 of Felder, skilled artisans would readily understand that a "well" is not a "spot" as this distinction is expressly taught by Felder. Applicants would appreciate the Examiner explaining how Felder's "wells" could be formed by ink jet printing.

The PTO has simply failed to meet its burden of pointing to disclosure in Felder evidencing that skilled artisans would understand that Felder's wells are sample spots. In fact, similar to the above discussion with respect to the rejection of claim 1, the very art reference (i.e., Felder) relied upon by the PTO directly contradicts the PTO's position. The rejection asserted against claim 3 should be withdrawn for this reason alone.

Moreover, as mentioned above, there is no disclosure in Felder of varying the concentration of the capture material in the capture solution from spot to spot. With reference to Fig. 12 of Felder, the concentration of DNA in Felder's array is increased by increasing the

number of spots arranged in each sample well, and not by increasing the concentration of a capture material *within the same sample spot*, as is recited in pending claim 3. Felder's use of multiple spots within different sample wells is a serious impediment on increasing the density of the spots positioned on the base plate, because more surface area is required for an increased number of spaced sample spots.

In contrast to Felder's DNA array, the presently claimed biochip makes it possible to greatly increase the density of sample spots without requiring a corresponding increase in the surface area of the base plate, as is the case in Felder. That is, since the concentration of the claimed spots can be varied without having to vary the size of the spots, more spots of different concentrations can be formed within the same area on the support. This enables wider diagnostic capability on a single test slide.

For all the foregoing reasons, reconsideration and withdrawal of the rejection of independent claim 3 and all claims dependent therefrom are respectfully requested.

Felder also does not disclose or suggest sample spots having a plurality of types of capture material being formed at a same spot formation position, as recited in pending claim 5. Similar to the discussion above, Felder instead discloses that the oligonucleotide anchors are formed at different spot formation positions within each well, and are not formed at a same spot formation position. For example, with reference to Fig. 10 of Felder, seven different oligonucleotide anchors are positioned at seven different spot formation positions within different sample wells. As explained above, the PTO's characterization that Felder's sample wells meet the claimed "spots of capture solutions" is erroneous viewed in light of the contradictory teaching in Felder.[2]

[2] Again, Col. 30-32 of Felder clearly teaches that spots (formed by ink jet printing) are positioned within each of Felder's sample wells. As such, Felder's sample wells are not "spots" within the meaning of Felder itself, let alone within the meaning of the present claims.

In view of all of the foregoing, reconsideration and withdrawal of the rejection of independent claim 5 and all claims dependent therefrom over Felder et al. are respectfully requested.

Nor is there any disclosure in Felder of the subject matter recited in new claim 33, which corresponds to claim 29 written in independent form. With reference to Fig. 17 of the present application, claim 33 recites that a first layer spot (80A) comprises a ridged peripheral portion (120) and a second layer spot (80B) is deposited on the first layer spot inside the ridged peripheral portion (120). This structure allows the concentration of the spot to be increased (by adding a second drop of solution) without increasing the size of the spot itself.

During the telephonic interview, and on page 6 of the Office Action, the PTO argued that Felder's DNA-bind coated wells provide a ridged peripheral portion of a first layer spot and Felder's oligonucleotide anchors comprise the claimed second layer spots. This interpretation is erroneous.

As explained above in detail, Felder's sample wells are not sample spots within the teachings of Felder itself (see column 30, lines 30-32 of Felder), let alone within the context of the present claims, which clearly require the spots to be formed by an ink jet system. As such, the DNA-bind material coated on Felder's sample well surface, which is employed to attach Felder's oligonucleotide anchors, is not a first layer spot in the context of claim 33. Furthermore, it is clear that Felder's sample well is not a sample spot which is adapted to specifically react with a specimen and provide information about a structure within the specimen.

During the July 16, 2002 telephonic interview, the PTO contended that the limitation "adapted to specifically react with a specimen" has a broad meaning in the art and does not necessarily mean DNA hybridization. It is, however, clear from the disclosure in Felder that

Felder's oligonucleotide anchors are not "specimens" within the meaning of Felder. For example, there is no disclosure or suggestion anywhere in Felder that the DNA-bind coated wells are used to provide information about a structure within the oligonucleotide anchors or an unknown test sample. Rather, the DNA-bind coated wells are employed merely as an attachment means to attach the oligonucleotide anchors to a surface of the sample wells. Therefore, Felder does not disclose or suggest depositing a second layer spot inside the ridged peripheral portion of a first layer spot, wherein ***both*** first and second layer spots specifically react with a specimen and provide information about a structure within the specimen. As such, Felder does not even recognize that sample spots can be more densely packed on the base plate surface in this manner. Accordingly, new claim 33 clearly defines patentable subject matter over Felder.

For all the foregoing reasons, applicants respectfully submit that all pending claims herein define patentable subject matter over the art of record.

If Examiner Forman believes that contact with Applicants' attorney would be advantageous toward the disposition of this case, she is herein requested to call Applicants' attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-1446.

Respectfully submitted,

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Date

Stephen P. Burr
Reg. No. 32,970

SPB/SC/tlp

BURR & BROWN
P.O. Box 7068
Syracuse, NY 13261-7068

Customer No.: 025191
Telephone: (315) 233-8300
Facsimile: (315) 233-8320

1. (Twice Amended) A biochip comprising a large number of spots containing capture solutions arranged on a base plate, obtained by supplying, onto said base plate by means of an ink jet system, a plurality of types of said capture solutions each of which is adapted to specifically react with a specimen and provide information about a structure within the specimen, wherein:

a plurality of said spots, which have different spot sizes, are formed on said base plate.

3. (Twice Amended) A biochip comprising a large number of spots of capture solutions containing a capture material therein arranged on a base plate, obtained by supplying, onto said base plate by means of an ink jet system, a plurality of types of said capture solutions each of which is adapted to specifically react with a specimen and provide information about a structure within the specimen, wherein:

a plurality of said spots are formed in which the concentration of the capture material in the capture solution varies from spot to spot.

5. (Twice Amended) A biochip comprising a large number of spots containing capture solutions arranged on a base plate, obtained by supplying, onto said base plate by means of an ink jet system, a plurality of types of said capture solutions each of which is adapted to specifically react with a specimen and provide information about a structure within the specimen, wherein:

each of said spots has a plurality of types of capture material, and said spots are formed at a same spot formation position.

VERSION WITH MARKINGS TO SHOW CHANGES MADE
Amended claims

The paragraph beginning at page 16, line 12, has been amended as follows:

The precipitated DNA fragments are rinsed with ethanol, followed by centrifugation. After that, the DNA fragments are dried to produce the DNA powder (purification step S12). A certain amount of x1 TE buffer is added to the obtained DNA powder, followed by being left to stand for several hours to completely dissolve the DNA powder (mixing step S13). Thus, the sample solution is prepared. The concentration of the sample solution at this stage is 0.1 to 10 μg/~~ml~~μliter.

VERSION WITH MARKINGS TO SHOW CHANGES MADE
Amended specification paragraph